

and management are clearly based on knowledge gained with the National type of producer, and would not in every case be applicable to another form.

The description on p. 56 of the arrangements in the Crossley plant for varying the entering mixture is not very clear, and throughout the book but little is said of the generators produced by this firm, and it is limitations of this kind which are the chief fault that can be urged against an otherwise admirable book.

THE NATIONAL COLLECTION OF FISHES

Guide to the Gallery of Fishes in the Department of Zoology of the British Museum (Natural History), Cromwell Road, London, S.W. Pp. v+209. (London: Printed for the Trustees, 1908.) Price 1s.

THE unique collection described in this guide consists mainly of stuffed specimens, coloured, as far as possible, to resemble the fishes in their natural conditions. "I believe," says the director in the preface, "that there is no other collection of fishes in a public museum in which the specimens are presented without the usual iron supports, with sufficient space around each fish and in natural colours, instead of the oily-brown which all dried fishes tend to acquire." All preserved material is kept in a separate building, where it is accessible only to special applicants. This arrangement is very desirable, since arrays of jars displaying mystifying anatomical details merely serve to distract the general student of fishes who wishes to devote his attention to the external features of as many species as possible, acquiring, at the same time, such information about each as will enable him to understand their natural relationships, their places in the economy of nature, and the special character and variety of fish-life in all its aspects. This is the chief object of the collection, and of the descriptive labels attached to each specimen case. "This guide is a collection of the labels with some additions, arranged systematically so as to show the groups into which fishes are divided, and is illustrated by figures which are to a large extent taken from photographs of the specimens actually seen in the cases."

The variety and interesting character of the information given in this guide is fairly illustrated by the following samples:—

"The Herring, *Clupea harengus*, 255, is found on both European and American sides of the North Atlantic, and is especially abundant in the North Sea and off Norway. It may thus be regarded as a northern and a cold-water fish. The 'Herring' of the North Pacific is of another species, *Clupea pallasii*. The Herring fisheries of the North Sea take place during the spawning season, which reaches its height in June off Shetland, and in November off Lowestoft. The fishing fleets move southwards as the centre of shoaling shifts from point to point. The spawn of the Herring, unlike that of most food fishes, even the allied Pilchard and Sprat, sinks to the bottom; but the fish are mostly caught near the surface in drift-nets, which may be more than a mile in length for each boat. About 8,000,000 cwt. of Herrings, valued at more than 2,000,000l., are annually landed

in Great Britain. The largest Herrings come from Loch Fyne, in Scotland."

"The Sea-brems and Snappers belong to the family Sparidae; they are coast fishes, widely distributed, and mostly carnivorous. The spinous and soft portions of the dorsal fin are continuous and nearly equal in extent; the lower rays of the pectoral fin are branched; the lower pharyngeal bones are separate. The genera of the family are distinguished the one from the other chiefly by the characters of the teeth."

In view of the recent rapid growth of our knowledge and increasing public concern regarding our food-fishes, it is not surprising that special attention has lately been devoted by the keepers of the gallery to these fishes. They are distinguished from other fishes by the letters B.F.F. (British Food Fish), while the descriptive labels attached to each specimen give the latest information (repeated in this guide) concerning its economic importance and value, the principal fishing grounds, means of capture, food, and habits.

Altogether, it may safely be said that a student who conscientiously examines the fish series in the national collection and who assimilates the information contained in this guide will acquire an accurate, vivid, and comprehensive knowledge of the world of fishes, a possession not only valuable in itself, but the best possible foundation for more special studies.

W. W.

THE RESISTANCE AND PROPULSION OF SHIPS.

Hydraulics. In two vols. Vol. ii., The Resistance and Propulsion of Ships. By Prof. Dunkerley. Pp. iv+253. (London: Longmans, Green and Co., 1908.) Price 10s. 6d. net.

THIS is the second volume of a treatise on hydraulics written by the author. Its origin may be traced to his previous service as professor of applied mechanics in the Royal Naval College at Greenwich, where students of naval architecture and marine engineering taking advanced courses receive instruction in the resistance and propulsion of ships. A good text-book on these subjects, bringing information up to date, has been much needed, and this volume (of about 250 pages) will be welcomed. It brings together in a clear and compact form the modern theories of stream-lines and wave-motion, and summarises experimental investigations on resistance and propulsion, thus sparing readers the labour and trouble incidental to personal research in many and scattered publications containing the original papers of Rankine, William Froude, Scott Russell, Cotterill, R. E. Froude, and other authorities. The mathematical parts of the book are well written, and the descriptive sections are interesting; numerous diagrams assist the explanations. Practical applications of scientific methods to the design of steamships and their propellers find a place, although no attempt is made to intrude on the special province of the naval

architect and marine engineer. In these sections of the book considerable use is made of information published in the Transactions of the Institution of Naval Architects and other technical publications, always with due acknowledgment.

There are six chapters. The first deals with "stream-lines," mainly following Rankine's methods, but also discussing Prof. Hele Shaw's interesting experiments on viscous stream-line flow and Sir George Stokes's mathematical investigations thereon. Next an excellent summary is given of the theory of wave-motion; for waves of translation and oscillation, and for capillary waves. Methods of observing ocean waves, and some results of such observations, are also described. In this section reference is made to original work done by Prof. Osborne Reynolds in connection with groups of waves.

Two interesting chapters—making up about one-fourth of the book—are devoted to an epitome of modern methods of determining the resistance of ships, due for the most part to the work of William Froude, whose enunciation of the "law of comparison" between ships and models, and investigations of frictional, eddy-making, and wave-making resistance are described in detail. Since the system of model-experiments was introduced by Froude about forty years ago, great extensions have taken place in the trials made with full-sized ships, and the comparisons of the results of such trials with those obtained with model ships and propellers have yielded much valuable information. This result is illustrated in many ways by the author, in a chapter dealing with the trials of ships. Considerable interest will be taken in the discussion of the influence which *depth of water* has upon the resistance of ships, especially in view of certain extraordinary results obtained on the trials of some recent torpedo-boat destroyers. In a final chapter the characteristics and relative efficiencies of water-jet propellers, paddle wheels, and screw propellers are discussed at length, the work of the two Froudes, Rankine, Cotterill, and Charles Parsons being utilised. No part of the book shows greater labour than this in its assemblage and analysis of facts and theories. A good index completes the volume.

On its merits the book deserves, and will receive, favourable recognition from all interested in the subjects of which it treats. That recognition will not be lessened by the fact that its appearance is coincident with a serious breakdown in health of its gifted author, involving his resignation of the professorship of civil and mechanical engineering in the University of Manchester. To this circumstance may be attributed certain errors in mathematical formulæ occurring in the book, and these should be corrected in future editions. There is evidence, too, that the book was, for the most part, completed some time ago; as it gives no account of valuable experimental investigations made during the last two or three years in this country and the United States. As it stands it may be recommended as a text-book for the use of students, working under the guidance of competent teachers.

STUDIES IN THE STATISTICS OF PRODUCTION.

Kraft: Ökonomische, technische und kulturgeschichtliche Studien über die Machtentfaltung der Staaten.

By Prof. E. Reyer. Pp. xvi+380. (Leipzig: W. Engelmann, 1908.) Price 6 marks.

THE subject with which Dr. Reyer deals in this volume is an extremely wide one, viz. "the supply and consumption of human, animal and mechanical and thermal energy for domestic purposes and in agriculture, industry and transport." Practically speaking, the subject, as he interprets it, is coterminous with what is usually understood by the statistics of production, and we cannot help thinking that some such title would have better described the work. Dr. Reyer deals not merely, or even principally, with statistics of power as such, but with the means of obtaining heat and power, the uses to which it is put, and even the organisation of industry. The replacement of handwork by wholesale manufacture, the output of coal, the development in the use of steel, transport by land and sea, agriculture, gas and electric lighting all come under his survey.

The labour that Dr. Reyer must have spent on his work and on the preparation of the numerous illustrative diagrams is immense, and some of his studies serve to emphasise very well the great changes that have taken place of recent years in the industries of the world, and more especially in the relative positions of Germany, Great Britain, and the United States—the three countries to which the author devotes most of his attention. Taking the volume as a whole, however, we do not think that Dr. Reyer can be said to have fulfilled his task very happily, though it will be readily conceded that many difficulties are inherent in the subject. The data are very imperfect, usually incomplete, and nearly always incomparable as between one country and another. Still, there are data, and the volume might, we think, have been made both more readable and more useful to the student.

In the first place, the chapters read as if they were isolated studies, made at different times, and subsequently thrown together with little or no attempt at arrangement. The first three are entitled "The Age of Steel," "Mining and the Importance of Coal," and "The Noble Metals" respectively, and form to some extent a connected series. The reader expects the following chapters to deal with other industries, but chapter iv. treats of the growth of population and development of industry in the case of the Great Powers, chapter v. passes to the industries of a single country—the United States—chapter vi. gives a general discussion on the subject of wholesale manufacture and handwork, and the next chapter deals with economic fluctuations! After this we come to transport and then to agriculture. The book has no obvious structure or plan, and the erratic changes of subject are most distracting to the reader.

In the second place, references are almost entirely lacking. There are few or none in the text, and a hopelessly inadequate bibliography at the end of the volume, a bibliography which suggests that the author must have taken much of his information at second